



First Mediterranean record of *Diaphana marshalli* (Sykes, 1904) (Gastropoda, Diaphanidae) - a rare bathyal species

Primera cita para el Mediterráneo de *Diaphana marshalli* (Sykes, 1904) (Gastropoda, Diaphanidae) - una especie rara del batial

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ABSTRACT

The rare bathyal gastropod *Diaphana marshalli* (Sykes, 1904), previously known only for the Atlantic, is reported for the first time in the Mediterranean. The specimens, collected off Hadera, Israel, are photographed and compared with its Mediterranean congener, *D. jonica* Di Geronimo, 1974

RESUMEN

Se cita por primera vez en el Mediterráneo el gasterópodo *Diaphana marshalli* (Sykes, 1904), una especie rara del batial, previamente conocida solamente en el Atlántico. La cita se basa en ejemplares recogidos frente a Hadera, Israel, que se ilustran y se comparan con su congénere del Mediterráneo, *D. jonica* Di Geronimo, 1974

INTRODUCTION

The bathyal molluscs of the Levantine Sea are scarcely known. Nearly a century passed from STUARNY'S (1896) publication of the specimens collected during the voyages of the "POLA" (1890-1893), JANSSEN'S (1989) report of those collected by "METEOR" [cruise 5] (1987) and Bogi's account of the few specimens collected by "POSEIDON" [cruise 201/2] (1994) from Eratosthenes Seamount (GALIL AND ZIBROWIUS, 1998). A total 42 species were identified from material collected during a series of cruises conducted between 1994 and 1999 as part of pollution monitoring surveys by the Israel Oceanographic and Limnological Research (IOLR) off

the northern coast of Israel (BOGI AND GALIL, 2004). Of these, five species constituted new records for the eastern Mediterranean, and 8 were newly recorded from the Levantine Sea. Two specimens, earlier considered juveniles of an unidentified gastropod, have been recently re-examined and recognized as *Dipahana marshalli* (Sykes, 1904).

MATERIALS AND METHODS

The area investigated is located off the coast of Israel, at depths between 1227 and 1454 m. The material was collected during monitoring surveys of a

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deepwater coal fly ash disposal site off Hadera (between 32° 38' N 34° 02' E and 32° 36' N 34° 16' E). The samples were collected aboard the R/V *Shikmona*, using a 45 ft Marinovich type deep water trawl (codend mesh 6 mm) with a 0.5 mm plankton net secured atop. The samples were preserved in 10% buffered formalin aboard ship. In the laboratory,

the samples were washed and sieved through a 250 µm mesh, preserved in 70% alcohol, stained in Rose Bengal and sorted. Two specimens (with soft parts) were collected at a depth of 1400 m in September 1997 [1,5 x 0,91 mm (fig. 2); 1,3 x 0,8 mm (figs. 3 – 5)]. The smaller specimen was damaged, the larger one is preserved in the Bogi collection.

TAXONOMY

OPISTHOBRANCHIA Milne-Edwards, 1848

CEPHALASPIDEA P. Fischer, 1883

DIAPHANIDAE Odhner, 1914

Diaphana Brown, 1827

Diaphana marshalli (Sykes, 1904)

Discussion: *Diaphana marshalli* is an exceedingly rare species. Aside from the type series collected off Portugal, only two additional specimens are known: a shell collected by the "THALASSA" Expedition (station Z 447, 48° 47', 11° 12', 1450 – 1500 m) and cited as *Retusa* (?) *marshalli* by BOUCHET (1975), and a 2.1 mm high specimen with soft parts, collected by the "INCAL" Expedition 1976 (station CP08, 50° 15' N, 13° 14' W, 2644 m) (SCHIØTTE, 1999).

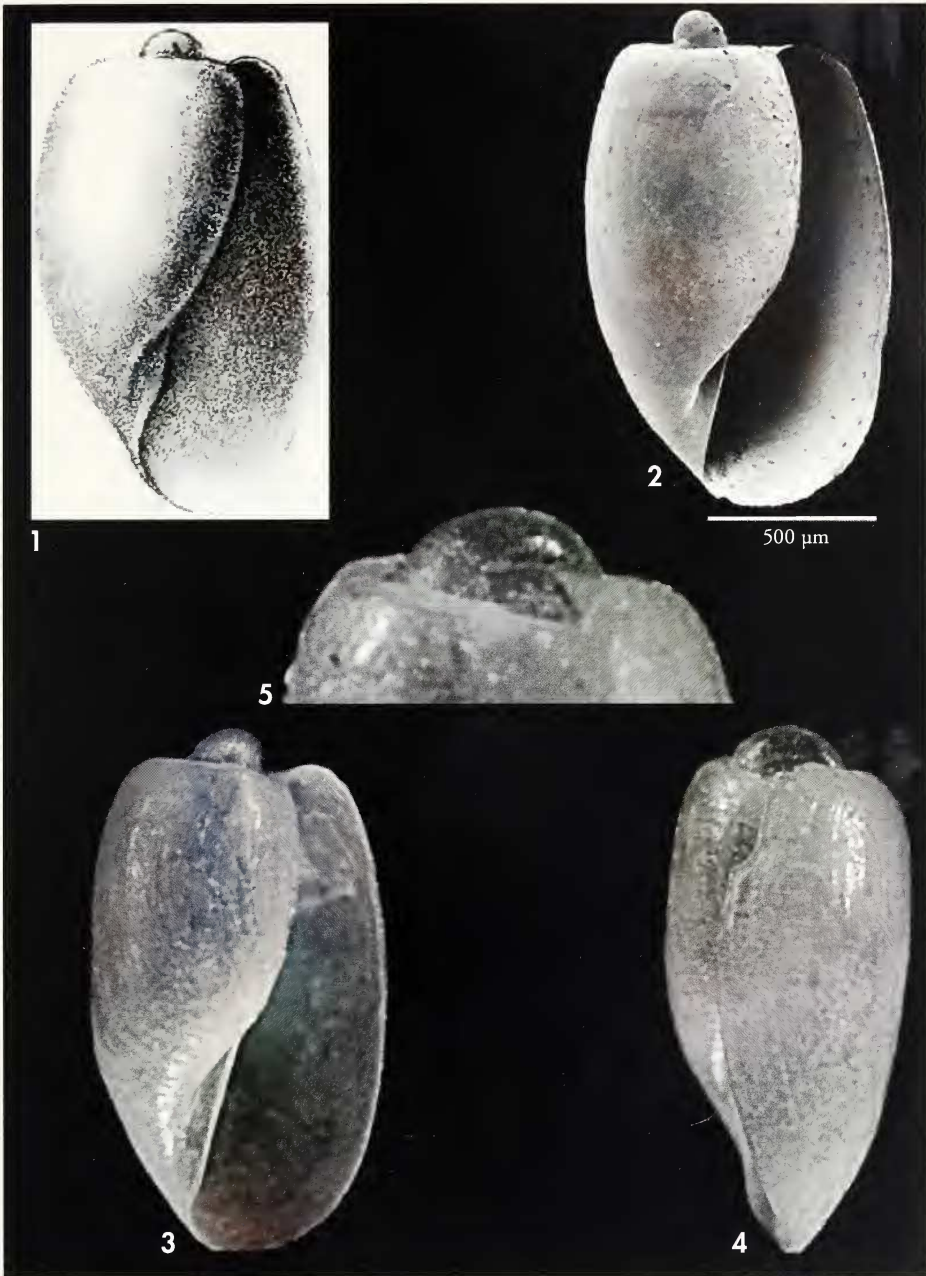
Retusa marshalli was described and illustrated (SYKES, 1904: 31, figs. 5, 6, 6a, b) from specimens collected by the "PORCUPINE" Expedition of 1870, off Portugal, at station 17, at 600-1095 fathoms. Only a single specimen was measured ("Alt. 2, diam. max. 1.1 mm", there, p. 32), though the author refers to another, larger specimen ("one specimen, broken, is larger than the type", there, p. 32). SYKES' illustration (1904, fig. 6) is reproduced (fig. 1).

BOUCHET (1975: 334) expressed doubt on the species' generic placement: "Des caractères tels que la présence d'un ombilic ou la conformation du sommet semblent très originaux pour une *Retusa* et il est vraisemblable que lorsque l'animal sera connu, une séparation générique deviendra nécessaire". BOUCHET AND WARÉN (1979) examined Sykes' material, illustrated

the shell and referred to it as "holotype" (there, fig. 18 i), though that shell, at 2.45 mm, was rather larger than the specimen measured by Sykes. These authors declared '*Retusa marshalli*' "probably a *Diaphana*" (there, p. 237). SCHIØTTE (1999) reported that the type material consisted of a "holotype" 2.45 mm high (BMNH1922122) and "pieces of 4 or 5 additional specimens, labelled as syntypes, all dry shells" (there, p. 87).

Few species of *Diaphana* Brown, 1827 have been recorded from the Mediterranean Sea, but the only one resembling *D. marshalli* is *D. jonica* Di Geronimo, 1974. The latter has been considered a junior synonym of *D. lactea* (Jeffreys, 1877) by BOUCHET AND WARÉN (1979) who examined the type. SCHIØTTE (1999: 124) who compared illustrations of both species declared "... there is a very good resemblance between the shells of *D. lactea* and *D. jonica*".

BOUCHET AND WARÉN (1979: 237) separated '*Retusa marshalli*' from its congener *D. lactea* as the former has "... a whitish unsculptured shell with an umbilical chink, but the larval shell is white, not brown as in *lactea*, and the broadest part of the aperture is at the lower third of the shell, instead of the middle of the shell. In '*R. marshalli*' the larval shell is completely visible even in adult specimens when seen



Figures 1-5. *Diaphana marshalli* (Sykes, 1904). 1: Sykes' illustration, reproduced, height 2.45 mm; 2: Scanning electron micrograph of the larger Levantine specimen, height 1.5 mm; 3: adapertural view of smaller Levantine specimen, height 1.3 mm; 4: side view of the same specimen; 5: detail of the apex of the same specimen.

Figuras 1-5. Diaphana marshalli (Sykes, 1904). 1: Reproducción de la ilustración de Sykes, altura 2,45 mm; 2: Micrografía electrónica de barrido del mayor ejemplar levantino, altura 1,5 mm; 3: Vista adapertural del menor ejemplar levantino, altura 1,3 mm; 4: vista lateral del mismo ejemplar; 5: detalle del ápice del mismo ejemplar.

from the adapertural side, while in *lactea* only the topmost part of the larval shell protrudes above the top of the body whorl. 'R'. *marshalli* is smaller, being only 2.45 mm when adult".

On comparing DI GERONIMO'S (1974) description and SEM image of the holotype of *D. jonica* with the Levantine specimens of *D. marshalli* it was apparent that the shell of the former is more cylindrical and slender than the shell of the latter species, its height-to-width ratio being 1,84 compared with 1,6-1,65 in *marshalli*; the columella differently set and the umbilicus narrower; the apex of *D. jonica* is described as "più o meno sporgente", but is similar to that of *D. lactea* as figured in BOUCHET AND WARÉN (1979) with only the topmost part of the larval shell protruding above the body whorl.

The reproductive biology of *D. marshalli* is unknown, but the size of its larval shell indicates planktotrophic larval development (BOUCHET AND WARÉN,

1979: 231). SCHIÖTTE (1999: 133) agrees "... interestingly, deep-water species usually seem to have planktotrophic development". This may explain the occurrence of a rare Atlantic bathyal diaphanid gastropod in the Levantine Sea. The common mollusks at depths greater than 1000 m off the Israeli coast are eurybathic Atlanto-Mediterranean and Boreal species with an upper bathymetric range enabling them to overcome the barriers posed by the shallow Gibraltar Straits and the Siculo-Tunisian sill (< 400 m), or stenobathic species with epipelagic larvae. Indeed, the present record of *D. marshalli* agrees with the distribution patterns of the Levantine deep water benthos (GALIL, 2004).

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